years, and he finds from these three orbits the following residual errors for the second normal place :—

	Longitude.	Latitude.
	″	″
Parabola	− 3·1	+ 25·7
11-year ellipse	− 0·6	+ 12·9
5½-year ellipse	− 0·3	+ 4·1

Mr. Chandler finds that an attempt to reduce these errors in latitude on the assumption of a parabolic orbit or an elliptic orbit of 11 years' period, will only lead to intolerable discordances in the longitudes, and he considers that for both these hypotheses the residuals are far in excess of the probable error of the normal position. For the shorter period, on the contrary, the residuals seem well within reasonable limits of error, and his conclusion therefore is that the comet will be found to revolve in about 5½ years. His ellipse with this assumed period is as follows, and will be found in close agreement with that obtained on a similar hypothesis from the observations of the present year, by MM. Schulhof and Bossert, which we gave last week :—

Perihelion passage, 1869, November 18·59702 Washington M.T.

Longitude of perihelion	42 58 53	M. Eq.
,, ascending node	296 46 2	1869·0
Inclination	5 23 44	
Excentricity	0·6581359	
Semi-axis major	3·10971	
Log. perihelion distance	0·0265728	

It appears that the comet was observed at Harvard College until January 3, 1870, or three days later than at any other observatory, and Prof. Pickering has had these late observations very carefully reduced.

At the actual appearance a communication from Mr. Lewis Boss, Director of the Dudley Observatory at Albany, N.Y., shows that the comet was micrometrically referred to a star, with the 13-inch refractor of that establishment, on the evening of October 11, but the declination of the comparison-star (B.D. + 17°·4611) needs further examination; it might be referred to Bessel's star 38s. following and about 6½′ north. If good observations can be obtained towards the end of the present month the elliptic orbit may admit of pretty close determination from the observations of 1880 alone. The following ephemeris is calculated from MM. Schulhof and Bossert's ellipse of 5½ years :—

At Greenwich midnight

	R.A	Decl. N.	Log. Δ.
	h. m. s.	° ′	
Dec. 23 ...	5 28 18 ...	35 3·4 ...	9·3514
24 ...	5 30 38 ...	34 28·9	
25 ...	5 32 51 ...	33 55·6 ...	9·3736
26 ...	5 34 58 ...	33 23·4	
27 ...	5 36 59 ...	32 52·5 ...	9·3957
28 ...	5 38 55 ...	32 22·6	
29 ...	5 40 47 ...	31 53·7 ...	9·4177
30 ...	5 42 35 ...	31 25·8	
31 ...	5 44 19 ...	30 58·9 ...	9·4828
Jan. 1 ...	5 45 59 ...	30 33·0	
2 ...	5 47 35 ...	30 8·0 ...	9·5041
3 ...	5 49 7 ...	29 44·1	
4 ...	5 50 34 ...	29 21·2 ...	9·5252
5 ...	5 51 56 ...	28 59·2	

A NEW COMET.—A small, pretty bright comet was discovered by Dr. Pechüle at Copenhagen on the evening of December 16, in R.A. 18h. 49m., Decl. + 10° 30′. Daily motion, + 5m. and + 40′.

OCCULTATION (?) OF 73 PISCIUM BY JUPITER.—On February 3, 1881, according to Leverrier's Tables of the planet Jupiter and the position of the star 73 Piscium (rated 6·0m. in the *Durchmusterung*) brought up from the Greenwich Catalogue of 1872, the star should be occulted by the planet about 2h. 8m. G.M.T. Very small change however in the place or semi-diameter of the planet, might suffice to bring about merely an appulse. The facts of the case may be well ascertained in easterly longitudes, as at Madras, where the conjunction in Right Ascension appears to occur when the planet is 3h. 26m. past the meridian, about 7h. 29m. mean time. The apparent place of the star on February 3 is in R.A. 0h. 58m. 43·53s., Decl. + 5° 1′ 10″·2. The polar semi-diameter of the planet, according to the value of mean semi-diameter now adopted in the *Nautical Almanac*, will be 17″·2, and allowing for parallax, this seems to place the star a little over 2″ within the planet's northern limb.

METEOROLOGICAL NOTES

FROM an able and temperately-worded article in the New York *Nation* on the Signal-Service Succession, it is plain that meteorology is in a critical position in the United States at the present moment. The whole question of the future of meteorology in that country practically turns on the sort of man who is to be appointed to succeed the late lamented Gen. Myer. As regards the bearing of the question on the promotion of the great financial, commercial, and educational concerns of the country, the writer of the article well puts it when he states that "it depends altogether on the future management of the office whether its activity shall be confined to a lifeless routine without any attempt to make new discoveries or introduce improved methods, or whether it shall be animated by that progressive spirit which will not be satisfied until every man within reach can be informed of coming meteorological changes as long in advance as it is possible for them to be foreseen." To accomplish this end much more is needed than a most diligent discharge of the daily duties of the office, such as will put the public in possession of forecasts drawn up on the lines that have hitherto been followed in forecasting the weather. It was an essential feature of General Myer's procedure that in framing the forecasts in the office he confined himself simply to making the best use of what was already known of meteorology. But whilst this continued the practice of his office, he had the genius to see that if the system of forecasting weather is to make way it is absolutely indispensable to strike out entirely new lines of observation with the view of arriving at some positive knowledge of the great movements of the atmosphere and their determining causes. Hence his great scheme of International Meteorology, by which was secured one daily observation at the same physical instant, where possible, over the globe, and the regular publication of the monthly results in the U.S. Weather Maps, with which our readers are familiar. These admirable maps, together with the Weather Maps of the States themselves, published at intervals of eight hours through a period of ten years, now furnish a mass of material the value of which it is not possible to overestimate; and the adequate discussion of which, it may be very safely said, is the next great step to be taken by meteorology. This step it is in the power of the United States to take, and whether it be taken or not depends almost wholly on the character of the man who may be called to fill the place so suddenly left vacant by General Myer's premature decease. What, above all, is imperatively required, is a sympathy with science and workers in science, so strong and so decided that he will, without fail, enlist in the service of his country some of the best intellects who will give their time and their energies to work out the great problem of weather prognosis.

THE American mails inform us that a frost of unusual severity for the season set in over Canada and the middle States on November 19. It came so suddenly and with such intensity that vessels of every description were frozen up and fixed, in many cases in mid-stream. The cold was greatest all along the St. Lawrence, where the thermometer ranged from zero to − 10°·0. Several ocean steamers, even, were placed in a very precarious position, and altogether it is estimated that 800 vessels laden with grain, potatoes, fruit, and other produce were frozen up; and many deaths have occurred in consequence of the frost. So early and intense a frost has not been experienced in Canada since 1873. Closely following it occurred a remarkable depression of temperature in the British Islands, which as regards certain districts in North Britain was unprecedented at so early a period in the winter months. It was an accompaniment of a wide-spread area of high pressure which appeared off the north-west of Scotland on the 20th as shown by the English and German daily weather maps. On this day temperatures fell low for the season, particularly along the west from Cornwall to Shetland. On the 21st the high-pressure area had advanced a considerable way towards the south-east, and under the clear skies and light winds which characterised it, the temperature fell in many places in Scotland to a degree which would have been noteworthy in the depth of winter. The protected thermometer fell at Aboyne Castle on Deeside to zero, and to 1°·0 at several places, viz., at Lanark in Clydesdale, at Stobo Castle near the head of the Tweed, and at Thirlestane Castle on the Leader. These low temperatures were approximated to at a considerable number of the other stations of the Scottish Meteorological Society situated in the larger valleys in in-

land situations. As on similar occasions, the influence of the sea in arresting the fall of temperature was strikingly seen. Thus the minimum temperatures on the 21st were 31°·7 at Portpatrick, 8°·3 at Drumlanrig Castle on the Nith, 1°·0 at Stobo Castle and Thirlestane Castle, 11°·7 at Milne Graden near Coldstream, and 17°·7 at Eyemouth on the East Coast. At Douglas Castle and Thirlestane Castle the unprotected thermometer fell to −6°·0.

MR. H. S. EATON has rendered a great service to meteorology by a paper on the average height of the barometer in London, which has just appeared in the *Journal* of the Meteorological Society for October. The great value of the paper consists not so much in the long period of 100 years for which the monthly averages of each year are given, as in this, combined with a careful and laborious elimination of instrumental errors and errors arising from breaks of one or more days in the observations of the months. The series is sufficiently extended as to entitle it to be considered one of the most valuable we possess in dealing with questions of secular meteorological variations. The mean atmospheric pressure at 32° and sea-level for London is 29·952 inches, the mean monthly maximum 29·996 inches occurring in June, and the minimum 29·900 inches in November, the mean for October being nearly as low, viz., 29·909 inches. In a discussion which followed the reading of the paper Mr. Strachan remarked that even another 100 years' observations would not alter the positions of these points of the London curve—a remark no doubt quite true for London. On advancing however to the south-west the means for June and July approach towards equality, and ultimately the July mean becomes the larger as we advance into the region of high pressure which occupies the Atlantic to the south-west during this month. On the other hand, as we proceed northward, the means for May and June approach towards equality till about the south of Scotland the mean for May becomes the maximum for the year, and the further north the more decidedly is May the maximum, till in Iceland it exceeds the mean of any other month by the tenth of an inch. Attention was drawn to the dips in the curve of pressure for April and July. These in all probability are permanent features in the London curve of pressure for March-April and July when drawn from a long average, since the former is connected with the east winds of spring and the latter with the great summer barometric depression which falls to the lowest point in July in the interior of the Europeo-Asiatic continent.

IN the same number Mr. Marriott gives a brief *résumé* of three years' observations made by Mr. F. E. Cobb at Stanley, in the Falkland Islands, which, from the geographical position of the place, possess some interest. The results show a mean annual pressure of 29·604 inches, the maximum occurring in winter, and the minimum in summer. A singular feature of the monthly means is their comparative steadiness from year to year, the highest being 29·819 inches for August 1876, and the lowest 29·342 inches for February of the same year. The difference of these two extremes is only 0·477 inch. It would be difficult to select from Mr. Eaton's 100 years mean pressures for London any consecutive three years which would show so small a variation between their two extreme monthly means as do these Falkland Islands' observations. The prominent features of pressure in those islands would appear to be its variability, the constant recurrence of rapid changes, and the comparative absence of protracted periods of very low, but especially very high pressures—occasioned in all likelihood by there being no great mass of land in that quarter of the globe. A like equableness from year to year characterises the temperature and rainfall of the climate. The rainfall is surprisingly small, amounting only to twenty inches in the year; but the falls, though not heavy, are frequent, there being 236 rainy days in the year. The lowest mean temperature of any of the thirty-six months was 35°·4, and the highest 52°·6. The climate is eminently a dripping one, and when the range of its temperature is taken into consideration, and its high winds, it is one of the most disagreeable climates of the globe.

GEOLOGICAL NOTES

NAINI TAL LANDSLIP.—In NATURE, vol. xxii. p. 505, attention was directed to landslips in connection with the catastrophe at Naini Tal on September 18. We have just received part 4 of vol. xiii. of the *Records* of the Geological Survey of India, containing a paper by Mr. R. D. Oldham, of the staff of that Survey, who was deputed to examine and report on the landslip to the Director. From this paper and a note appended to it by Mr. Medlicott, it appears that we were in error in supposing Naini Tal to stand upon Tertiary rocks. It lies just to the north of the younger formations, and is situated upon "more or less imperfectly-cleaved clay slates." These rocks are subject to a decomposition which penetrates deep into their mass, and it would seem to have been the cover of loose, decomposed detritus which, thoroughly saturated with water from the heavy rains, slid down the hill, and gave rise to the catastrophe.

THE "CHALLENGER" WORK.—Steady progress is being made in the investigation of the deep-sea deposits dredged up by the *Challenger* Expedition. M. Renard has established himself at Edinburgh, where, in concert with Mr. J. Murray, he is busily engaged in subjecting the various dredgings to chemical and microscopic analysis. In the first volume, devoted to an account of the bottom of the ocean, will be gathered together the facts amassed during this laborious study. It will avoid all speculation, but will contain such a body of data for the explication of the sedimentation and chemistry of the ocean abysses as has never before been available. In a subsequent volume the authors will develop the views to which their prolonged and minute investigations have led them. No part of the work of the *Challenger* promises to possess a profounder interest in geology.

GEOLOGICAL SURVEY OF BELGIUM.—The dual organisation for the Geological Map of Belgium is likely to lead to some curious reduplications and complications. Besides the staff under the direction of M. Dupont, there are other geologists independently at work under the Ministry of the Interior who are determined to lose no time in bringing out sheet after sheet of the geological map as surveyed by them. In particular the Baron O. Van Ertborn and M. Paul Cogels have been eminently energetic. The Baron made a convention with the Ministry towards the end of last year to complete six sheets with their explanatory texts before June 1 of the present year. He has been able to keep his engagement except as regards the Lubbeek sheet, for which he obtained a delay until the close of this year. We have just received the Boisschot and d'Aerschot sheets. Meanwhile M. Dupont makes no sign. Specimens of his map were seen at the Paris Exhibition in 1878, and also at the Dublin meeting of the British Association last year. But so far as we are aware, nothing has yet been issued. The Director is understood to be resolved to make his map the most perfect geological map that has ever been published. It is being chromolithographed at Leipzig. Considerable interest is naturally felt among geologists to see the first completed specimens of this long-expected work. We are curious also to know what will happen when the Official Survey and the free-lances meet on the same ground. Will the Government publish two different geological maps? The position reminds us of that which roused the activity of the Congress of the United States a few years ago, when it was discovered that the same Territory in the far West was sometimes independently surveyed by two or three different organisations, all paid out of the public purse. Only in Belgium things are worse, for the country is small, and the certainty of reduplication must have been foreseen from the beginning.

GEOGRAPHICAL NOTES

AT the meeting of the French Geographical Society on November 19, M. Henri Duveyrier read an important memorandum which he had drawn up on the subject of the sources of the Niger. After going carefully into the question of Major Laing's prior discovery and various matters relating to the hydrographic system of the Niger basin, he thinks it very doubtful if any other stream will ever be discovered having a right to be deemed the chief source of the river, than the Tembi-Kundu visited by MM. Zweifel and Moustier. M. Duveyrier's remarks will no doubt be published in an early number of the French Geographical Society's *Bulletin*, and it may be hoped that it will be illustrated by a large scale map. At the annual meeting of the Society last Friday, M. Maunoir read his usual report on the work of the Society and the progress of geographical knowledge. It was announced that the Society had now about 2100 members, being an increase of about 100 in the year.

HEFT 3 of vol. ii. of the *Mittheilungen* of the German African Society contains a brief report of the work of the year. The